

*PRESS TOOL DESIGN FOR BLANKING  
AND PIERCING OPERATIONS.*

*by  
MAZERIS COSTAS*

*Project report  
submitted to*

*the Department of Mechanical Engineering  
of the Higher Technical Institute  
Nicosia Cyprus*

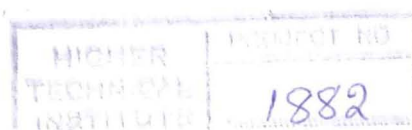
*in partial fulfilment of the requirements  
for the diploma of*

*TECHNICAL ENGINEER*

*in*

*MECHANICAL ENGINEERING*

*June 1991*



## ACKNOWLEDGMENTS

I would like to express my most sincere thanks to my project supervisor , Mr. D. Roushas for his help and advice , willing cooperation and the enthousiasm that he showed.

I would also like to express my thanks to "ELINDA" S.A. (Hellenic industries of electrical appliances) and "ALCO" (Filters industry) for giving me the opportunity to have a training on the field of presswork and therefore to carry a practical experience that helped me a lot in writing this project.

Finally I thank all those that by any way helped me.

Thank you all,  
Mazeris Costas.

## CHAPTER 1

### *- GENERAL THEORY ON BLANKING AND PIERCING OPERATIONS AND PRESS TOOLS DESIGN.*

#### 1.1 INTRODUCTION

When someone visits a modern production plant, views the press department as an assemblage of noisy mechanical "monsters" calmly chopping out parts from a roll of metal strip. But he never realises that this department plays an extremely important role in our domestic life, being largely responsible for many of the comforts and amenities which have been brought within the reach of all classes.

Presses and presswork technique is widely used in industry mainly during the more recent years. This is because it is a rapid, an accurate, and an economical method of articles production from sheet metal at very high production rates with either unskilled or semi-skilled labour. Therefore the results are a very considerable saving in both material and labour and in most cases an article pleasing in appearance.

Some of the operations done in this department are: blanking, piercing, lancing, cutting off and parting, notching, shaving, bending, forming, drawing etc. Usually combinations of these operations are used because by this method time is saved therefore the production cost of the article is decreased.

Finally a combination of two of these operations will be used during this project since it's objective is to design a press tool for blanking and piercing of a component ( a mounting plate of a filter ).

## CONTENTS.

### *Acknowledgements*

	<u>PAGE</u>
<u>Chapter 1:</u> - General theory on blanking and piercing operations and press tool design.	
1.1 Introduction.	1
1.2 What is blanking and piercing.	2
1.3 Blanking and piercing press tool	3
<u>Chapter 2:</u> - The component to be produced	
2.1 What a filter is ?	6
2.2 Description of an oil filter.	7
2.3 Description of the mounting plate.	8
<u>Chapter 3:</u> - Press tool design.	
3.1 Calculation of the cutting force.	12
3.2 Calculation of stripping force.	13
3.3 Selection of stripper springs.	14
3.4 Calculation and selection of press capacity.	15
3.5 Calculation of cutting clearance.	16
3.6 Selection of punches.	18
3.7 Design of die block 1.	19
3.8 Design of stripper plate.	22
3.9 Design of die block 2.	23
3.10 Design of shedder.	24
3.11 Design of punch holder.	27
3.12 Design of thrust plate.	28
3.13 Design of stop.	29
3.14 Design of stock strip guides	30
3.15 Design of knockout mechanism.	31
3.16 Selection of die set.	36
3.17 Selection of stripper bolts.	37
3.18 Selection of dowels.	37
3.19 Selection of screws.	37
<u>Chapter 4:</u> - Economic appraisal of the tooling system.	
4.1 Introduction.	39
4.2 Cost of die block 1.	41
4.3 Cost of stripper.	43
4.4 Cost of die block 2.	44
4.5 Cost of shedder.	45
4.6 Cost of punch holder.	46
4.7 Cost of thrust plate.	47
4.8 Cost of knockout mechanism.	48
4.9 Cost of stop.	49

4.10	Cost of stock strip guides.	51
4.11	Cost of die set.	52
4.12	Cost of punches.	53
4.13	Cost of springs.	53

## Chapter 5

5.1	Inspection of the press tool.	55
5.2	Setting of the press tool.	55
5.3	Maintenance of the press tool.	56

<u>Conclusions.</u>	57
---------------------	----

<u>References.</u>	58
--------------------	----

<u>Appendices.</u>	60
--------------------	----

1.	Description of materials.	61
2.	ISO Limits & Fits.	70
3.	Standard components.	73
3.1	Dowels.	74
3.2	Stripper bolts.	75
3.3	Springs.	76
3.4	Punches.	87
3.5	Die sets	100
4.	Presses.	119
5.	Drawings.	142